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16 *Attorneys for Plaintiff Corephotonics, Ltd.*

17 UNITED STATES DISTRICT COURT

18 NORTHERN DISTRICT OF CALIFORNIA

19 COREPHOTONICS, LTD.,

20 Plaintiff,

21 vs.

22 APPLE, INC.,

23 Defendant.

Case No. 5:17-cv-06457

**COMPLAINT FOR PATENT
INFRINGEMENT**

DEMAND FOR JURY TRIAL

COMPLAINT

Plaintiff Corephotonics, Ltd. (“Corephotonics”) hereby submits its Complaint against Defendant Apple, Inc. (“Apple”) and alleges as follows:

NATURE OF THE ACTION

1. This is a civil action for infringement under the patent laws of the United States, 35 U.S.C. § 1 *et seq.*

2. The United States Patent and Trademark Office duly and legally issued U.S. Patent No. 9,402,032 (the “’032 patent”), entitled “Miniature Telephoto Lens Assembly,” on July 26, 2016. Corephotonics is the legal owner of the ’032 patent by assignment. A true and correct copy of the ’032 patent is attached hereto as Exhibit A.

3. The United States Patent and Trademark Office duly and legally issued U.S. Patent 9,568,712 (the “’712 patent”), entitled “Miniature Telephoto Lens Assembly,” on February 14, 2017. Corephotonics is the legal owner of the ’712 patent by assignment. A true and correct copy of the ’712 patent is attached hereto as Exhibit B.

4. The United States Patent and Trademark Office duly and legally issued U.S. Patent No. 9,185,291 (the “’291 patent”), entitled “Dual Aperture Zoom Digital Camera,” on November 10, 2015. Corephotonics is the legal owner of the ’291 patent by assignment. A true and correct copy of the ’291 patent is attached hereto as Exhibit C.

5. The United States Patent and Trademark Office duly and legally issued U.S. Patent No. 9,538,152 (the “’152 patent”), entitled “High Resolution Thin Multi-Aperture Imaging Systems” on January 3, 2017. Corephotonics is the legal owner of the ’152 patent by assignment. A true and correct copy of the ’152 patent is attached hereto as Exhibit D.

6. Apple has infringed and continues to infringe one or more claims of each of the ’032 patent, the ’712 patent, the ’291 patent and the ’152 patent (collectively, the “Asserted Patents”). Corephotonics seeks, among other things, monetary damages and injunctive relief.

THE PARTIES

7. Plaintiff Corephotonics is a company organized and existing under the laws of the State of Israel with its principal place of business at 25 HaBarzel St., Tel Aviv 6971035, Israel.

1 8. Upon information and belief, Defendant Apple is a corporation organized and
2 existing under the laws of the State of California with its principal place of business at 1 Infinite
3 Loop, Cupertino, California.

4 **JURISDICTION AND VENUE**

5 9. This Court has subject matter jurisdiction over Corephotonics' claims for patent
6 infringement pursuant to the 28 U.S.C. §§ 1331 and 1338(a).

7 10. Apple is subject to this Court's personal jurisdiction because Apple resides and has
8 its primary place of business within this District. This Court also has personal jurisdiction over
9 Apple because Apple has committed and induced acts of patent infringement and has regularly and
10 systematically conducted and solicited business in this District by and through at least its sales and
11 offers for sale of Apple products and services, and other contractual arrangements with Apple
12 customers and third parties using such Apple products and services located in and/or doing
13 business in this District.

14 11. Venue is proper in this District under 28 U.S.C. §§ 1391(b) and 1400(b) because
15 Apple resides in this District, has a regular and established place of business in this District, and
16 has committed acts of infringement in this District.

17 **INTRADISTRICT ASSIGNMENT**

18 12. This action for patent infringement is assigned on a district-wide basis under Civil
19 L.R. 3-2(c).

20 **FACTUAL ALLEGATIONS**

21 **A. Corephotonics' Technology**

22 13. Corephotonics is a pioneer in the development of dual camera technologies for
23 mobile devices. Corephotonics was founded in 2012 to develop the next generation of smartphone
24 cameras. Its founders brought with them decades of experience in the fields of optics and
25 miniature digital cameras and were led by Dr. David Mendlovic, a professor at Tel Aviv
26 University and former Chief Scientist of the Israeli Ministry of Science.

27 14. Corephotonics' dual-aperture camera technology changes the way smartphones
28 take pictures by using advanced lens design and sophisticated computational optics. The advanced

1 lens design is used to create a miniature telephoto lens that can fit within the confines of a modern,
2 thin smartphone but still provides the superior image quality and light sensitivity demanded by
3 smartphone consumers. Corephotonics filed for and received patents on its advanced lens design,
4 including the '032 and '712 patents.

5 15. Corephotonics' dual-aperture camera technology uses two fixed-focal length
6 lenses, a wide angle lens similar to those typically found in a smartphone using a single-aperture
7 camera, and a telephoto lens. In a typical single-aperture camera, all zoom functionality is
8 provided with digital zoom. "With digital zooming . . . a processor in the camera crops the image
9 and interpolates between the pixels of the captured image to create a magnified but lower-
10 resolution image." ('291 patent at 1:44-48.) In contrast, a traditional optical zoom is
11 accomplished by using a variable focal length lens array. In Corephotonics' dual-aperture camera,
12 the second camera with telephoto lens provides much higher optical resolution than the wide angle
13 camera. Images from both of these cameras can be fused together using computational algorithms
14 to create a continuous zoom that is a combination of digital and optical zoom.

15 16. For video, which captures thirty or more frames per second, Corephotonics
16 discovered that implementing image fusion for each frame demands higher than normal processing
17 resources and battery drain. At the same time, the beneficial pixel finesse achieved by image
18 fusion is less observable at the rapid frame rate of HD video due to human perception limits. In
19 the Corephotonics dual-aperture camera, therefore, image fusion is only used when taking still
20 pictures, but not for video. In video, when zooming in, digital zoom is used first on the image
21 from the wide angle camera only and then switched to the image from the telephoto camera only.
22 When zooming back out, a similar transition happens from using the telephoto camera only,
23 switching back to the wide angle camera only. This approach minimizes resources and power.
24 Because the two lenses are different and necessarily view the subject from different points of
25 view, Corephotonics developed special techniques to ensure that the transition from the wide lens
26 to the telephoto lens and back would be smooth. Corephotonics filed for and received patents on
27 its dual-aperture camera and the related computational optics, including the '291 and '152 patents.

28

1 17. The press recognized the advances being made by Corephotonics. Corephotonics
 2 demonstrated its dual-aperture camera technology at Mobile World Congress (MWC) 2014 and
 3 received very positive reviews from the tech media, including headlines such as “Corephotonics’
 4 dual-camera tech will change smartphone imaging”¹ and statements like “We think [the
 5 Corephotonics dual camera technology] has the potential to change the direction of smartphone
 6 photography.”²

7 **B. Corephotonics’ Relationship with Apple**

8 18. As one of its first acts as a company, Corephotonics reached out to Apple in the
 9 hopes of establishing a strategic partnership. Corephotonics received many encouraging reports
 10 and positive feedback from Apple about its technology, but the parties never concluded a license
 11 to the Corephotonics technology. In fact, after one failed effort to negotiate a license, Apple’s
 12 lead negotiator expressed contempt for Corephotonics’ patents, telling Dr. Mendlovic and others
 13 that even if Apple infringed, it would take years and millions of dollars in litigation before Apple
 14 might have to pay something.

15 19. In January 2016, Corephotonics learned that among the new iPhones Apple would
 16 introduce later that year was an iPhone 7 Plus with a dual-aperture camera—precisely the
 17 technology Corephotonics claimed in its patents.

18 **FIRST CAUSE OF ACTION**

19 **Infringement of Patent No. 9,402,032**

20 20. Corephotonics incorporates the foregoing paragraphs as though fully set forth
 21 herein.

22 21. Apple has directly infringed, and continues to directly infringe, one or more claims
 23 of the ’032 patent, including but not limited to claim 1, pursuant to 35 U.S.C. § 271, by making,
 24
 25

26 ¹ [https://www.cnet.com/news/corephotonics-dual-camera-tech-will-change-smartphone-](https://www.cnet.com/news/corephotonics-dual-camera-tech-will-change-smartphone-imaging/)
 27 [imaging/](https://www.cnet.com/news/corephotonics-dual-camera-tech-will-change-smartphone-imaging/)

28 ² [https://www.cnet.com/news/best-of-mobile-world-congress-samsung-galaxy-s5-mozilla-25-](https://www.cnet.com/news/best-of-mobile-world-congress-samsung-galaxy-s5-mozilla-25-phone-smart-glove-and-more/)
[phone-smart-glove-and-more/](https://www.cnet.com/news/best-of-mobile-world-congress-samsung-galaxy-s5-mozilla-25-phone-smart-glove-and-more/)

1 using, selling, offering to sell, and/or importing within the United States, without authority, the
 2 iPhone 7 Plus and the iPhone 8 Plus (“Accused Products”).

3 22. As just one non-limiting example, set forth below (with claim language in italics) is
 4 a description of infringement of exemplary claim 1 of the ’032 patent in connection with the
 5 iPhone 7 Plus. Corephotonics reserves the right to modify this description, including, for
 6 example, on the basis of information about the iPhone 7 Plus that it obtains during discovery:

7 *1. A lens assembly, comprising:* To the extent the preamble is limiting, the iPhone 7 Plus
 8 telephoto lens is a lens assembly.

9 [1a] *a plurality of refractive lens elements arranged along an optical axis,* The iPhone 7
 10 plus telephoto lens consists of five refractive lens elements arranged along an optical axis.

11 [1b] *wherein at least one surface of at least one of the plurality of lens elements is*
 12 *aspheric,* Each of the five lens elements in the iPhone 7 Plus telephoto lens is aspheric.

13 [1c] *wherein the lens assembly has an effective focal length (EFL), and wherein the lens*
 14 *assembly has a total track length (TTL) of 6.5 millimeters or less and a ratio TTL/EFL of less than*
 15 *1.0,* The TTL of the iPhone 7 Plus telephoto lens is less than 6.0 mm and its EFL is greater than
 16 6.5 mm. Therefore, the ratio of TTL/EFL in the iPhone 7 Plus telephoto lens is less than 1 (6/6.5
 17 < 1).

18 [1d] *wherein the plurality of lens elements comprises, in order from an object side to an*
 19 *image side, a first lens element with positive refractive power and a second lens element with*
 20 *negative refractive power, wherein a focal length f_1 of the first lens element is smaller than $TTL/2$.*
 21 The first lens element in the iPhone 7 Plus telephoto lens, from an object side, has a positive
 22 refractive power and a focal length less than 2.7 mm. The TTL of the iPhone 7 Plus telephoto lens
 23 is greater than 5.9 mm The second lens element has a negative refractive power. The focal length
 24 of the first lens element is less than TTL/2 ($2.7 < 5.9/2$).

25 23. From at least as early as February 18, 2015, Apple has had actual knowledge that
 26 Corephotonics was seeking patent protection for its telephoto lens design. On that date in the
 27 prosecution of Apple’s patent application no. 14/069,027, the Patent and Trademark Office cited,
 28 as its primary reference, U.S. Patent Publication 2015/0029601 to Dror, et al, which was the

1 publication of the patent application to which the '032 patent claims priority. The '601
2 publication and the '032 patent share an identical specification and include claims of similar
3 scope. The citation of the '601 publication put Apple on notice that Corephotonics was seeking
4 patent protection for its lens design such that Apple knew or should have known that the telephoto
5 lens in the iPhone 7 Plus dual-aperture camera infringed or would infringe a Corephotonics patent.

6 24. Consequently, Apple's infringement of the '032 patent has been and continues to
7 be willful, entitling Corephotonics to enhanced damages in accordance with 35 U.S.C. § 284.

8 25. Apple has actual knowledge of Corephotonics' rights in the '032 patent and details
9 of Apple's infringement of the '032 patent based on at least the filing of this Complaint and, based
10 on that knowledge, is also indirectly infringing the '032 patent.

11 26. Apple manufactures, uses, imports, offers for sale, and/or sells the Accused
12 Products with knowledge of or willful blindness to the fact that its actions will induce Apple's
13 customers and end users to infringe the '032 patent by at least using the telephoto lens on the
14 Accused Products.

15 27. Apple actively and knowingly induces its customers and end users to infringe the
16 '032 patent by publishing information promoting the zoom features of the Accused Products, and
17 by providing its customers and end users with instructions for using those features. For example,
18 Apple highlighted the benefits of the telephoto lens when it introduced the iPhone 7 Plus. *See*
19 https://www.youtube.com/watch?v=NS0txu_Kzl8 at 1:08:22, and [https://www.youtube.com/](https://www.youtube.com/watch?v=Q6dsRpVyyWs)
20 [watch?v=Q6dsRpVyyWs](https://www.youtube.com/watch?v=Q6dsRpVyyWs) at 1:05.

21 28. As the direct and proximate result of Apple's conduct, Corephotonics has suffered
22 and, if Apple's conduct is not stopped, will continue to suffer, severe competitive harm,
23 irreparable injury, and significant damages, in an amount to be proven at trial. Because
24 Corephotonics' remedy at law is inadequate, Corephotonics seeks, in addition to damages,
25 preliminary and permanent injunctive relief. Corephotonics' business operates in a competitive
26 market and it will continue suffering irreparable harm absent injunctive relief.

27 29. Corephotonics is entitled to injunctive relief and damages of no less than a
28 reasonable royalty in accordance with 35 U.S.C. §§ 271, 281, 283, and 284.

1 power. The telephoto lens in the iPhone 7 Plus camera also has a fourth and a fifth lens element
2 where the gap between the fourth lens element and the third lens element is greater than 1.4 mm.
3 The TTL of the iPhone 7 Plus telephoto lens is less than 6.0 mm. $TTL/5$ is, therefore, less than
4 1.2. The gap between the third lens element and the fourth lens element (1.4 mm) is, therefore,
5 greater than $TTL/5$ (1.2 mm).

6 34. From at least as early as February 18, 2015, Apple has had actual knowledge that
7 Corephotonics was seeking patent protection for its telephoto lens design. On that date in the
8 prosecution of Apple's patent application no. 14/069,027, the Patent and Trademark Office cited,
9 as its primary reference, U.S. Patent Publication 2015/0029601 to Dror, et al, which was the
10 publication of the patent application to which the '712 patent claims priority. The '601
11 publication and the '712 patent share an identical specification and include claims of similar
12 scope. The citation of the '601 publication put Apple on notice that Corephotonics was seeking
13 patent protection for its lens design such that Apple knew or should have known that the telephoto
14 lens in the iPhone 7 Plus dual-aperture camera likely infringed a Corephotonics patent.

15 35. Consequently, Apple's infringement of the '712 patent has been and continues to
16 be willful, entitling Corephotonics to enhanced damages in accordance with 35 U.S.C. § 284.

17 36. Apple has actual knowledge of Corephotonics' rights in the '712 patent and details
18 of Apple's infringement of the '712 patent based on at least the filing of this Complaint and, based
19 on that knowledge, is also indirectly infringing the '712 patent.

20 37. Apple manufactures, uses, imports, offers for sale, and/or sells the Accused
21 Products with knowledge of or willful blindness to the fact that its actions will induce Apple's
22 customers and end users to infringe the '712 patent by using the telephoto lens on the Accused
23 Products.

24 38. Apple actively and knowingly induces its customers and end users to infringe the
25 '712 patent by publishing information promoting the zoom features of the Accused Products, and
26 by providing its customers and end users with instructions for using those features. For example,
27 Apple highlighted the benefits of the telephoto lens when it introduced the iPhone 7 Plus. *See*
28

1 https://www.youtube.com/watch?v=NS0txu_Kzl8 at 1:08:22, <https://www.youtube.com/watch?v=Q6dsRpVyyWs> at 1:05.

3 39. As the direct and proximate result of Apple's conduct, Corephotonics has suffered
4 and, if Apple's conduct is not stopped, will continue to suffer, severe competitive harm,
5 irreparable injury, and significant damages, in an amount to be proven at trial. Because
6 Corephotonics' remedy at law is inadequate, Corephotonics seeks, in addition to damages,
7 preliminary and permanent injunctive relief. Corephotonics' business operates in a competitive
8 market and will continue suffering irreparable harm absent injunctive relief.

9 40. Corephotonics is entitled to injunctive relief and damages of no less than a
10 reasonable royalty in accordance with 35 U.S.C. §§ 271, 281, 283, and 284.

11 41. Apple's infringement of the '712 patent is exceptional and entitles Corephotonics
12 to attorneys' fees and costs under 35 U.S.C. § 285.

13 **THIRD CAUSE OF ACTION**

14 **Infringement of Patent No. 9,185,291**

15 42. Corephotonics incorporates the foregoing paragraphs as though fully set forth
16 herein.

17 43. Apple has directly infringed, and continues to directly infringe one or more claims
18 of the '291 patent, including but not limited to claim 12, pursuant to 35 U.S.C. § 271, by making,
19 using, selling, offering to sell, and/or importing within the United States, without authority, the
20 Accused Products.

21 44. As just one non-limiting example, set forth below (with claim language in italics) is
22 a description of infringement of exemplary claim 12 of the '291 patent in connection with the
23 iPhone 7 Plus. Corephotonics reserves the right to modify this description, including, for
24 example, on the basis of information about the iPhone 7 Plus that it obtains during discovery:

25 *12. A method for obtaining zoom images of an object or scene in both still and video*
26 *modes using a digital camera, the method comprising the steps of:* To the extent the preamble is
27 limiting, Apple practices a method for enabling the iPhone 7 Plus to use its digital camera to
28 obtain zoom images of an object or a scene in both still and video modes.

a) providing in the digital camera a Wide imaging section having a Wide lens with a Wide field of view (FOV), a Wide sensor and a Wide image signal processor (ISP), a Tele imaging section having a Tele lens with a Tele FOV that is narrower than the Wide FOV, a Tele sensor and a Tele ISP, and a camera controller operatively coupled to the Wide and Tele imaging sections; and Apple has provided the iPhone 7 Plus rear-facing digital camera with a wide imaging section having a 28 mm wide angle lens with an associated field of view, an associated sensor and associated image signal processing, including within the A10 Fusion chip. Apple has also provided the iPhone 7 Plus rear-facing digital camera with a telephoto imaging section having a 56 mm telephoto lens with an associated field of view, an associated sensor and associated image signal processing within the A10 Fusion chip. The field of view associated with the telephoto lens is narrower than the field of view associated with the wide angle lens. Apple also provides the iPhone 7 Plus with a camera controller coupled to both the wide and telephoto imaging sections. See <https://support.apple.com/kb/SP744>; <http://appleinsider.com/articles/16/09/23/apples-iphone-7-camera-delivers-nice-slice-of-enhancements-but-iphone-7-plus-takes-the-cake> (“Apple’s A10 Fusion chip incorporates an enhanced custom Image Signal Processor that now performs over 100 billion calculations on every photograph it takes.”).

iPhone 7 Plus – Technical Specifications

Camera

- 12MP wide-angle and telephoto cameras
- Wide-angle: f/1.8 aperture
- Telephoto: f/2.8 aperture
- Optical zoom at 2x; digital zoom up to 10x



b) configuring the camera controller to combine in still mode at least some of the Wide and Tele image data to provide a fused output image of the object or scene from a particular point of view, and Apple has configured the iPhone 7 Plus to combine image data from both the wide imaging section and the telephoto imaging section. The output image will be either from the point

1 of view of the wide lens or the telephoto lens, depending on the zoom factor. See
 2 <https://forums.developer.apple.com/thread/63347> from an Apple staff member (emphasis added):

3 **When zoomed, the Dual camera intelligently fuses images from**
 4 **the wide-angle and telephoto cameras to improve image quality.**

5 This process is transparent to the user and happens automatically
 6 when you take pictures The point at which the cross over from
 wide-angle to telephoto happens depends on a variety of factors
 including current focus position, current zoom factor, and current
 exposure.

7 See also <https://developer.apple.com/videos/play/wwdc2017/507/> (Transcript of Presentation,
 8 2017 Apple WWDC, Session 507 by Brad Ford (emphasis added)):

9 So far, when you use the dual camera and take a picture, you still
 10 just get one image. It's either from the wide or it's from the tele,
 depending where you're zoomed, or **if you're in the area between**
 11 **one and 2X you might get portions of both as we do some**
blending to make an even nicer picture, but you still only get one.

12 *[b) configuring the camera controller . . .] to provide without fusion continuous zoom*
 13 *video mode output images of the object or scene, each output image having a respective output*
 14 *resolution, wherein the video mode output images are provided with a smooth transition when*
 15 *switching between a lower zoom factor (ZF) value and a higher ZF value or vice versa, and*
 16 *wherein at the lower ZF value the output resolution is determined by the Wide sensor while at the*
 17 *higher ZF value the output resolution is determined by the Tele sensor.* Apple has configured the
 18 iPhone 7 Plus dual-aperture camera to provide a continuous zoom in video mode, which does not
 19 use image fusion. According to Apple “[t]he Dual camera’s defining feature is its ability to
 20 smoothly transition between wide and tele cameras, acting like a single lens camera with optical
 21 zoom at 2x.” <https://forums.developer.apple.com/thread/63347>. Samples of the iPhone 7 Plus’
 22 smooth transition in video mode are available at [http://appleinsider.com/articles/16/09/23/apples-](http://appleinsider.com/articles/16/09/23/apples-iphone-7-camera-delivers-nice-slice-of-enhancements-but-iphone-7-plus-takes-the-cake)
 23 [iphone-7-camera-delivers-nice-slice-of-enhancements-but-iphone-7-plus-takes-the-cake](http://appleinsider.com/articles/16/09/23/apples-iphone-7-camera-delivers-nice-slice-of-enhancements-but-iphone-7-plus-takes-the-cake). Each
 24 output image has an output resolution, which is determined by the sensor being used, *i.e.*, wide
 25 sensor being used at low zoom factor and telephoto sensor being used at high zoom factor.

26 45. At least as early as the release of the iPhone 7 Plus, Apple has been also indirectly
 27 infringing the ’291 patent.

1 46. Apple has had actual knowledge of the '291 patent from at least March 24, 2016,
2 when Apple submitted the '291 patent as prior art in its pending patent application no. 14/88,386.

3 47. Apple manufactures, uses, imports, offers for sale, and/or sells the Accused
4 Products with knowledge of or willful blindness to the fact that its actions will induce Apple's
5 customers and end users to infringe the '291 patent by using the dual-aperture camera on the
6 Accused Products.

7 48. Apple actively and knowingly induces its customers and end users to infringe the
8 '291 patent by publishing information promoting the dual-aperture camera of the Accused
9 Products, and by providing its customers and end users with instructions for using that camera.
10 For example, Apple highlighted the benefits of the dual-aperture camera when it introduced the
11 iPhone 7 Plus. See https://www.youtube.com/watch?v=NS0txu_Kzl8 at 1:08:22,
12 <https://www.youtube.com/watch?v=Q6dsRpVyyWs> at 1:05.

13 49. As the direct and proximate result of Apple's conduct, Corephotonics has suffered
14 and, if Apple's conduct is not stopped, will continue to suffer, severe competitive harm,
15 irreparable injury, and significant damages, in an amount to be proven at trial. Because
16 Corephotonics' remedy at law is inadequate, Corephotonics seeks, in addition to damages,
17 preliminary and permanent injunctive relief. Corephotonics' business operates in a competitive
18 market and will continue suffering irreparable harm absent injunctive relief.

19 50. Corephotonics is entitled to injunctive relief and damages of no less than a
20 reasonable royalty in accordance with 35 U.S.C. §§ 271, 281, 283, and 284.

21 51. Apple's infringement of the '291 patent is exceptional and entitles Corephotonics
22 to attorneys' fees and costs under 35 U.S.C. § 285.

23 52. From at least as early as the introduction of the iPhone 7 Plus, Apple's
24 infringement of the '291 patent has been and continues to be willful, entitling Corephotonics to
25 enhanced damages in accordance with 35 U.S.C. § 284.

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27
28

FOURTH CAUSE OF ACTION

Infringement of Patent No. 9,538,152

53. Corephotonics incorporates the foregoing paragraphs as though fully set forth herein.

54. Apple has directly infringed, and continues to directly infringe one or more claims of the '152 patent, including but not limited to claim 1, pursuant to 35 U.S.C. § 271, by making, using, selling, offering to sell, and/or importing within the United States, without authority, the Accused Products.

55. As just one non-limiting example, set forth below (with claim language in italics) is a description of infringement of exemplary claim 1 of the '152 patent in connection with the iPhone 7 Plus. Corephotonics reserves the right to modify this description, including, for example, on the basis of information about the iPhone 7 Plus that it obtains during discovery:

1. A multi-aperture imaging system comprising: To the extent the preamble is limiting, the iPhone 7 Plus has a two-lens camera and, therefore, has a multi-aperture imaging system.

a) a first camera that provides a first image, the first camera having a first field of view (FOV₁) and a first sensor with a first plurality of sensor pixels covered at least in part with a standard color filter array (CFA); The iPhone 7 Plus rear-facing digital camera has two cameras. The first camera is a wide angle camera with a 28 mm wide angle lens having a first field of view to provide a first image. The wide angle camera has a first sensor, which contains a plurality of sensor pixels. The pixels of the sensor of the wide angle camera are covered with a standard color filter array.

b) a second camera that provides a second image, the second camera having a second field of view (FOV_2) such that $FOV_2 < FOV_1$ and a second sensor with a second plurality of sensor pixels, the second plurality of sensor pixels being either Clear or covered with a standard CFA, the second image having an overlap area with the first image; and, The iPhone 7 Plus rear-facing digital camera also has a second camera, which is a telephoto camera with a 56 mm telephoto lens having a second field of view to provide a second image that overlaps with the first image. The second field of view of the telephoto camera is narrower than the first field of view of the wide angle camera. The telephoto camera has a sensor with sensor pixels. These sensor pixels are covered with a standard filter array. See <https://support.apple.com/kb/SP744>.

iPhone 7 Plus – Technical Specifications

Camera

- 12MP wide-angle and telephoto cameras
- Wide-angle: f/1.8 aperture
- Telephoto: f/2.8 aperture
- Optical zoom at 2x; digital zoom up to 10x



c) a processor configured to provide an output image from a point of view of the first camera based on a zoom factor (ZF) input that defines a respective field of view (FOV_{ZF}), the first image being a primary image and the second image being a non-primary image, wherein if $FOV_2 < FOV_{ZF} < FOV_1$ then the point of view of the output image is that of the first camera, the processor further configured to register the overlap area of the second image as non-primary image to the first image as primary image to obtain the output image. The iPhone 7 Plus includes an image signal processor (ISP) in the A10 SOC, which is programmed to provide an output image from the point of view of the wide angle camera when the field of view at the selected zoom factor is greater than the telephoto field of view but less than the wide angle field of view. The ISP is also programmed to register the overlap of the two images and, using the wide angle image as the primary image, use both the wide angle and telephoto images to produce the output

1 image. See <https://forums.developer.apple.com/thread/63347> from an Apple staff member
 2 (emphasis added):

3 **When zoomed, the Dual camera intelligently fuses images from**
 4 **the wide-angle and telephoto cameras to improve image quality.**

5 This process is transparent to the user and happens automatically
 6 when you take pictures The point at which the cross over from
 wide-angle to telephoto happens depends on a variety of factors
 including current focus position, current zoom factor, and current
 exposure.

7 See also <https://developer.apple.com/videos/play/wwdc2017/507/> (Transcript of Presentation,
 8 2017 Apple WWDC, Session 507 by Brad Ford (emphasis added)):

9 So far, when you use the dual camera and take a picture, you still
 10 just get one image. It's either from the wide or it's from the tele,
 depending where you're zoomed, or **if you're in the area between**
 11 **one and 2X you might get portions of both as we do some**
blending to make an even nicer picture, but you still only get one.

12 56. At least as early as the release of the iPhone 7 Plus, Apple also has been indirectly
 13 infringing the '152 patent.

14 57. Apple has had actual knowledge of the application that issued as the '152 patent
 15 from at least March 24, 2016, when Apple submitted the publication of that application , U.S.
 16 Publication 20150085174, as prior art in its pending patent application no. 14/88,386.

17 58. Apple manufactures, uses, imports, offers for sale, and/or sells the Accused
 18 Products with knowledge of or willful blindness to the fact that its actions will induce Apple's
 19 customers and end users to infringe the '152 patent by using the dual-aperture camera on the
 20 Accused Products.

21 59. Apple actively and knowingly induces its customers and end users to infringe the
 22 '152 patent by publishing information promoting the dual-aperture camera of the Accused
 23 Products, and by providing its customers and end users with instructions for using that camera.
 24 For example, Apple highlighted the benefits of the dual-aperture camera when it introduced the
 25 iPhone 7 Plus. See https://www.youtube.com/watch?v=NS0txu_Kzl8 at 1:08:22,
 26 <https://www.youtube.com/watch?v=Q6dsRpVyyWs> at 1:05.

27 60. As the direct and proximate result of Apple's conduct, Corephotonics has suffered
 28 and, if Apple's conduct is not stopped, will continue to suffer, severe competitive harm,

1 irreparable injury, and significant damages, in an amount to be proven at trial. Because
2 Corephotonics' remedy at law is inadequate, Corephotonics seeks, in addition to damages,
3 preliminary and permanent injunctive relief. Corephotonics' business operates in a competitive
4 market and will continue suffering irreparable harm absent injunctive relief.

5 61. Corephotonics is entitled to injunctive relief and damages of no less than a
6 reasonable royalty in accordance with 35 U.S.C. §§ 271, 281, 283, and 284.

7 62. Apple's infringement of the '152 patent is exceptional and entitles Corephotonics
8 to attorneys' fees and costs under 35 U.S.C. § 285.

9 63. From at least as early as the filing of this complaint, Apple's infringement of the
10 '152 patent has been and continues to be willful, entitling Corephotonics to enhanced damages in
11 accordance with 35 U.S.C. § 284.

12 **PRAYER FOR RELIEF**

13 WHEREFORE, Plaintiff Corephotonics respectfully requests the following relief:

14 A. Judgment in Corephotonics' favor and against Apple on all causes of action alleged
15 herein;

16 B. An award of damages to Corephotonics in an amount to be further proven at trial;

17 C. Preliminary and permanent injunctive relief against Apple;

18 D. A finding that this case is exceptional under 35 U.S.C. § 285 and that
19 Corephotonics be awarded its attorneys' fees;

20 E. An award of treble damages to Corephotonics as a result of Apple's willful
21 infringement;

22 F. An award of prejudgment and post-judgment interest, costs and other expenses; and

23 G. Such other and further relief as the Court may deem to be just and proper.
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1 DATED this 6th day of November, 2017

QUINN EMANUEL URQUHART &
SULLIVAN, LLP

2
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DEMAND FOR JURY TRIAL

Plaintiff Corephotonics hereby demands trial by jury for all causes of action, claims, or issues in this action that are triable as a matter of right to a jury.

DATED this 6th day of November, 2017

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